REMARKS/ARGUMENTS

Claims 1-16 were presented initially in this application. Claim 2 has been canceled. Claims 1 and 3-16 remain for consideration. Claims 1 and 11-14 have been amended. No new claims are presented. Favorable reconsideration of the application is respectfully requested.

The claims of the present invention are drawn to a rotary cutting tool and an associated plurality of installable cutting inserts, wherein interrelationships affect cutting contact with a work piece which assures a previously unattainable fine surface finish.

1. Claims 2 and 14 stand rejected under 35 U.S.C. 112, first paragraph.

In claim 2, the meaning of "radial runout compensation" was held to be unclear. "Radial runout" is a term well understood within the machine tool industry, and refers to the degree by which points on each insert, once installed on a rotary cutting tool, depart from a theoretical perfect cylindrical surface of the cut (assuming a cylindrical bore is being formed in a work piece) which would arise during ideal rotary cutting operations. Radial runout may also be thought of as discrepancies in the radii of each of the many points which exist along the cylindrical cut surface from the rotational axis of the tool. Theoretically, in a perfect tool, every point would be at the same radius from the rotational axis as every other point. Because of manufacturing tolerances, this ideal situation has probably never existed.

Claim 2 has been canceled.

In claim 14, the Examiner has objected since the end of a pocket is recited but not defined. The term "pocket" in both objected to occurrences has been replaced by "insert". Claim 14 has been slightly amplified to specify that ends are located relative to the cutting edge. Inserts have ends defined at paragraph 22 of the specification (lines 9-18, page 5).

It is believed that cancellation of claim 2 cures deficiencies thereof, and that amendments made to claim 14 overcome objections to claim 14. Withdrawal of the rejection is respectfully requested.

2. Claims 1-16 stand rejected under 35 U.S.C. 102(b) as anticipated by Koelewijn, U.S. Patent No. 4,681,485, issued July 21, 1987. The Examiner asserts that Koelewijn shows corners.

Only the initial entry inserts of the device of Koelewijn have corners in the sense intended by the present invention (see column 2, lines 12-20 of Koelewijn). The remaining inserts can be circular (column 2, lines 47-60 of Koelewijn).

Claim 1 of the application recites and has always recited that "each insert has... a first corner formed at the juncture of the cutting edge and the first end, and a second corner..." (page 9, lines 14-19). Claim 1 has been amplified to reflect that these corners are discernible when the insert is viewed in plan. This is obvious from Figs. 5 and 6 and in light of conventional practice wherein inserts are installed on tools as shown in Fig. 1. No new matter is entered.

Since Koelewijn clearly states that round (circular) inserts may be used (column 2, lines 47-60), Koelewijn clearly contravenes the limitation of claim 1 that "each cutting insert" have corners (as "corners" are currently defined in the claims). This is because the tool of Koelewijn is directed to improving cutting action and decreasing wear (column 1, lines 19-30; column 2, lines 9-12; and column 2, lines 25-34), and not to improving first pass surface fineness. Therefore, due to differences in structure as presently claimed, Koelewijn is not applicable to the present claims under 35 U.S.C. 102. Claim 1 is seen therefore as being allowable over the prior art of record. Claim 2 has been canceled. Claims 3-10 are allowable as directly limiting, or in the case of claim 6, ultimately limiting, allowable Claim 1.

Claim 11 has been amended to include the limitation of corners, as presently defined. Claim 11 therefore defines over Koelewijn. Dependent claims 12, 13, 15, and 16 are allowable as further limiting allowable claim 11. Claim 14 ultimately depends from claim 11 and is therefore also allowable.

The invention is a subtle yet powerful relationship of structural characteristics of inserts and their associated rotary cutting tool, which characteristics combine to assure that the final machined surface has residual imperfections or deviations (grooves, scratches, cuts, kerfs, and other departures from a purely cylindrical ideal cut surface) that the final machined surface is that of a surface which needs no machining operation which is intended only to finish the machined surface rather than to impart configuration or to modify dimensions of the work piece. In prior art practice, a first machining operation has been required to impart configuration (e.g., curvature) and to establish a nominal dimension (e.g., diameter), with a follow-up operation being performed to satisfy the desired surface finish.

The operable and critical relationships of this invention are 1) that each insert has a cutting edge 30 which tapers to a predetermined degree from a point of maximum distance from the tool rotational axis 16 to points of minimal distance from the tool rotational axis, thereby establishing a radial runout compensation dimension seen as element 42 in Fig. 2; 2) that inserts are arrayed on the rotary cutting tool such that successive passes from two adjacent inserts (12A and 12B in Fig. 2) leaves an uncut peak or land in the work piece (seen at arrow set 46 in Fig. 2); and 3) that the difference in minimal and maximum radii of effective cutting radius of each installed insert (seen as arrow 42) is greater in magnitude than the magnitude of the height of the uncut peak or land (seen at arrow set 46).

The uncut peak or land of the work piece may be thought of as a profile or silhouette of two adjacent inserts as they pass a particular or individual rotational arbitrary or hypothetical reference point on the work piece as the tool rotates. This is depicted in Fig. 2, wherein a first insert 12A is passing a hypothetical reference point, with insert 12B having already passed the same reference point (or alternatively, not yet having passed the same reference point).

When these relationships exist, the assembled rotary cutting tool 10 and all inserts 12 collectively leave behind a cut surface with imperfections which are so limited in magnitude that no surface finishing is required.

Curvature or tapering of individual inserts has so limited, as seen in the dimensional examples of paragraph 26 of page 6 of the specification that it follows that the radius of curvature of cutting surface 30 is actually quite great. As inserts vary in size from perhaps a quarter of an inch to two inches in present machine tool industrial practice, it will be seen that the radius of curvature considerably exceeds the length of even the largest insert in conventional practice. This results in corners 32 and 34 which are typical for all inserts 12 disposed on the outer circumference of rotary cutting tool 10.

It should be mentioned that the explanation presented herein refers to cutting surface curvature since curvature is the most convenient although not the only way to cause variation in the runout dimension (radius from the tool rotational axis to the various points on the freshly cut surface of the work piece) along the cutting surface of the insert.

In summary, as Koelewijn is directed to an entirely different effect than that of the present invention, there is contained therein no suggestion of modifying the insert design to

the characteristic "barrel" shape having corners as presently claimed. Koelewijn is therefore not applicable under 35 U.S.C. 103.

For at least these reasons, Claims 1 and 3 –16 are allowable over the applied art. Withdrawal of the rejection is respectfully requested.

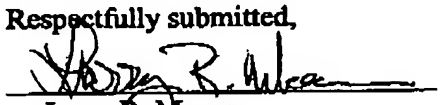
As a final matter, if the Examiner has any suggestions concerning different claim phraseology that, in the opinion of the Examiner, more accurately defines the present invention, prior to issuance of another Office Action, Applicants' undersigned attorney requests the courtesy of a telephone interview at the Examiner's earliest convenience to discuss the application. Applicants' undersigned attorney may be contacted at (724) 539-5485.

In view of the amendments and above remarks, it is believed that the application is in condition for allowance. Accordingly, an early Notice Of Allowance is respectfully requested.

Extension of Time

Applicants hereby Petition for an extension of time of two months from the Office Action date of January 26, 2005, until June 26, 2005. Please charge the petition fee for such extension to Deposit Account No. 502867.

Respectfully submitted,



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